

**Designation of lectotype and type locality for *Haliotis rugosa*  
Lamarck, 1822 (Mollusca: Gastropoda: Haliotidae)**

by

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**ABSTRACT**

A lectotype for *Haliotis rugosa* Lamarck, 1822, is designated. Conspecific material has been collected in the Mascarene Islands. The Mahébourg area of Mauritius is designated as type locality. The taxon appears to be a Mascarene endemic, but the possibility that it is a synonym of, and an earlier name for, *H. pustulata* Reeve, 1846, needs to be investigated.

**INTRODUCTION**

Ever since its original description *Haliotis rugosa* Lamarck, 1822, has been a name of doubtful application. Lamarck gave only a brief description, without locality data, and his reference to a published figure (Martini 1769:pl. 15, fig. 145) was tentative and consequently of little value. Pilsbry (1890) believed that the taxon was unidentifiable and subsequent authors appear to have ignored it or regarded it as a dubious name.

Mermod & Binder (1963) discussed the type material of *H. rugosa*, housed with the bulk of Lamarck's gastropod collection in the MHNG, and noted that it comprises a mixture of two species. They figured and gave descriptions of both, but did not restrict Lamarck's name to either one by designation of a lectotype. Thus the name *rugosa* still cannot be used unambiguously. In this paper I clarify the situation by selection of a lectotype and provide evidence as to the probable provenance of this.

*Haliotis rugosa* Lamarck, 1822

Figs 1–8

*Haliotis rugosa* Lamarck, 1822:217, No 12 [non Reeve, 1846]; Weinkauff, 1883:21; Mermod & Binder, 1963:149, fig. 216. Type locality: originally unknown, here designated Mahébourg area, Mauritius.

*Haliotis alternata* Sowerby, 1882:23, No 22, pl. 8, fig. 51; Pilsbry, 1890:101; Kaicher, 1981:2840. Type localities: "Malta, Gibraltar [sic], Mozambique". **Syn. n.**

**Lectotype designation**

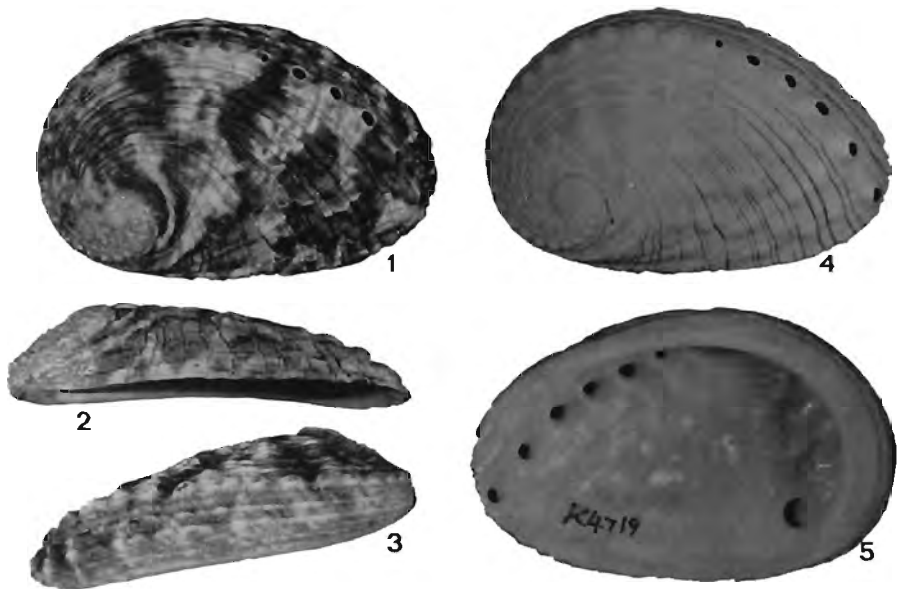
According to a marginal note written by Lamarck's daughter in his personal copy of 'l'Histoire des Animaux sans Vertèbres' (Lamarck 1822) there were three specimens of *rugosa* in the Lamarckian collection (see Mermod & Binder 1950 1963). These are presumably the same three still present in Geneva. Lamarck's original description and the reference to Martini's figure do not clearly apply to any one of these in particular and none is thus an obvious choice for lectotype.

Although the dimensions given by Lamarck can be matched with specimen No 3 of Mermod & Binder, it seems unlikely that Lamarck wished to accord this specimen any preferential status, but merely gave the dimensions of his largest specimen.

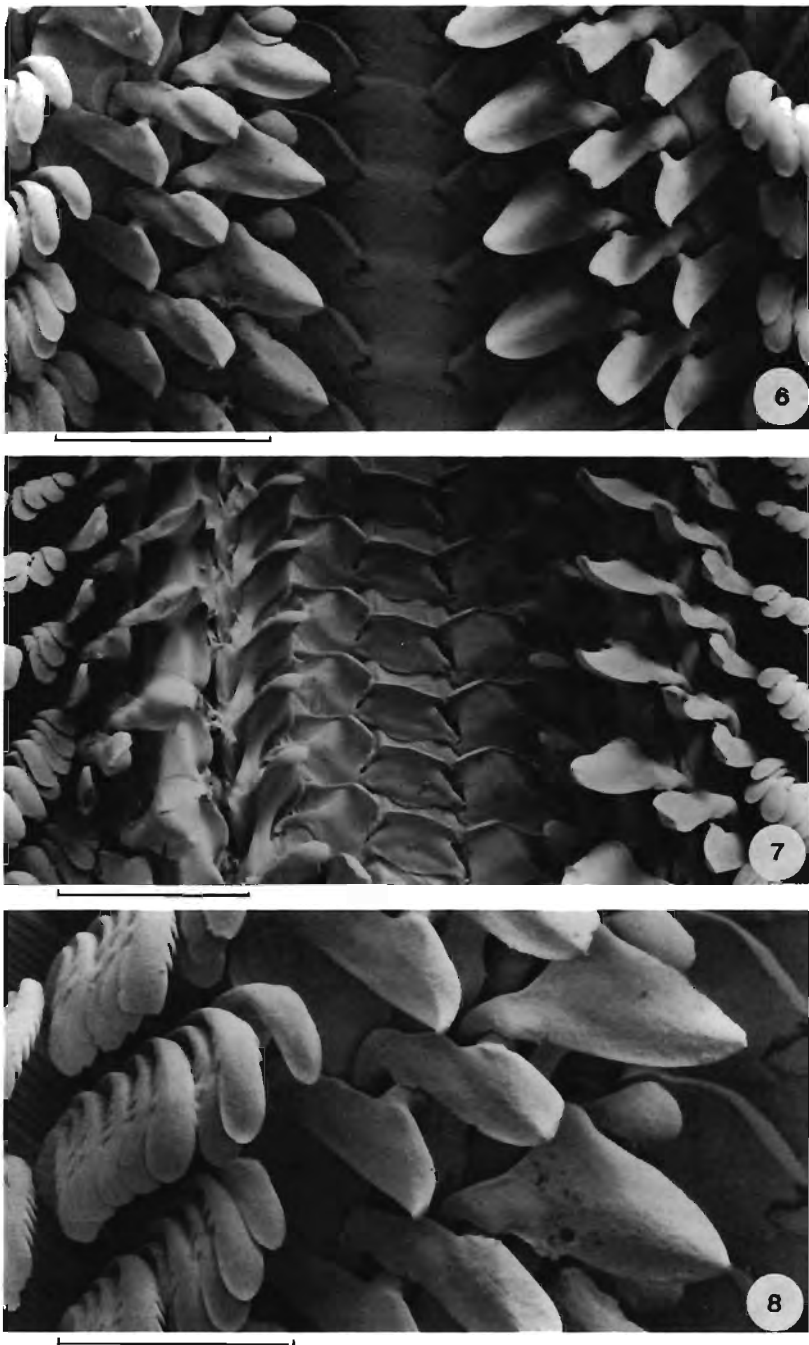
Nonetheless, because this specimen fits the cited dimensions, I designate it as lectotype. Furthermore it represents a relatively distinct, easily identifiable taxon characterised by the relatively wide, flat-topped spiral cords with narrow, sharply incised intervals, and one for which locality data are now available (see below). In contrast the specimen designated No 1 by Mermod & Binder (1963, fig. 216) closely resembles the problematic and highly variable species generally known as *H. pustulata* Reeve, 1846. Mermod & Binder indicate that their specimen No 2 is similar to the lectotype.

#### Designation of type locality

On a recent NM expedition to the Mascarene Islands of Mauritius and Reunion a number of *Haliotis* specimens were collected which closely resemble the lectotype, and are doubtless conspecific. One is here figured (Figs 1–5) for comparison with the Mermod & Binder (1963) figure of the lectotype. It is thus now possible to provide locality data for *H. rugosa* and in so doing I here designate the Mahébourg area in south-eastern Mauritius as the type locality. Lamarck is known to have acquired material from the south-western Indian Ocean and he gave l'Ile de France as the locality for a considerable number of new marine invertebrate taxa (Lamarck 1816–22), including 20 other species of mollusc (see Michel 1974). Mauritius had been a French possession until the Treaty of Paris in 1814 and was an important stop-over for the numerous trading ships at that time



Figs 1–5. *Haliotis rugosa* Lamarck, 1822, NM K4719, S. E. Mauritius, length 45,6 mm; fig. 4 coated with magnesium oxide.



Figs 6–8. *Haliotis rugosa* Lamarck, 1822, radula ex NM K5611 Reunion Island; 6, plan view of central part of middle section of radula, bar = 0,5 mm; 7, oblique view of more posterior part of radula with outer lateral teeth displaced to show inner ones, bar = 0,5 mm; 8, outer lateral and inner marginal teeth, bar = 0,3 mm.

sailing between Europe and the Far East. On my recent visit to Mauritius a number of specimens of *H. rugosa* were found in lagoonal beach drift between Blue Bay and Point Desny near Mahébourg – an important harbour at the end of the eighteenth century and thus a potential source of early Mauritian shells.

Locality data (all NM): MAURITIUS: between Blue Bay and Point Desny, beach drift within lagoon, R. Kilburn & D. Herbert (K4719); Mauritius unlocalised (J2843, K5719, J2829 *ex* H. Becker coll'n, F1683 *ex* H. Burnup coll'n, H8152 *ex* B. J. Young coll'n). REUNION ISLAND: La Saline les Bains (le Trou d'Eau) lagoon, sand, coral and stones, living, R. Kilburn & D. Herbert (K4715); St Leu lagoon, sand, coral and stones, living, R. Kilburn & D. Herbert (E4661); Cap Boucan Canot, north side, between and under small rocks and stones, sheltered intertidal flats, living, R. Kilburn & D. Herbert (K5611); Possession Bay, rounded boulders and stones below pebble beach, living, 3–6 m, dived D. Herbert (K5124).

#### Radula and external anatomy

Radula (Fig. 6–8): formula  $\infty + 5 + 1 + 5 + \infty$ ; asymmetrical, tilted posteriorly to the right; rachidian trapezoid, with low non-denticulate cutting edge; innermost lateral broad almost triangular, also with low non-denticulate cutting edge; second lateral, with distinct shaft and rounded cusp; three outer laterals well developed, similar to each other in shape, but decreasing in size from third to fifth, cusp hastate, set at right angles to tooth shaft; well developed interlocking of tooth shafts and bases; marginals slender, apices rounded with 3–6 subterminal denticulations on each side.

External anatomy: Typically haliotiform (see Crofts 1929); cephalic lappets fused centrally to form a thin, but relatively wide fold between the cephalic tentacles, dorsal surface of fold with grooves running antero-posteriorly, free margin appearing frayed; cephalic tentacles well developed, arising beneath junction of cephalic lappet and eye stalk base; epipodium continuous on both sides from beneath base of cephalic tentacle to posterior dorsal foot groove; epipodium composed of a dorsal and ventral ridge with somewhat concave area between; both ridges with numerous micropapillate tentacles separated by fimbriate lobes; tentacles variable in size, often alternating large and small, large tentacles usually arising from infoldings of ridge edge; concave area bearing numerous small irregular papillate projections, but lacking distinct tentacles.

#### DISCUSSION

*H. rugosa* is not uncommon on both Mauritius and Reunion, but I have found no specimens amongst haliotid material from continental East Africa. It is quite possible that the taxon is endemic to the Mascarene Islands (although I have not examined any haliotid material from Rodriguez). A number of other *Haliotis* species have been reported from this archipelago, including *H. pustulata* Reeve, 1846, *H. varia* Linne, 1758 (von Martens 1880; Pilsbry 1890; Drivas and Jay 1988), *H. revelata* Deshayes, 1863 (type locality Reunion), *H. venusta* Adams & Reeve, 1850 (Smith 1879) and *H. unilaterialis* Lamarck, 1822 (Pilsbry 1890). None

of these has the same broad cords and incised grooves of *H. rugosa*. However, my experience of *H. pustulata* indicates it to be a very variable species and it has undoubtedly been described as new on many occasions in the literature. Wagner & Abbott (1978) listed seven synonyms under *pustulata*, one of which, *H. alternata* Sowerby, 1882, merits further comment here.

The original description and figure of *H. alternata* clearly show it to be very similar to, and I believe conspecific with, *H. rugosa*. Indeed there is haliotid material from Mauritius in the NM (H. Becker coll'n) which is clearly referable to *H. rugosa* and which was identified by Sowerby (III) as *H. alternata*. Also, Kaicher (1981:2840) figured as *H. pustulata* form *alternata* a specimen of *H. rugosa*. Unfortunately the whereabouts of the type material of *H. alternata*, if still extant, is not known; none could be found at the BM nor is any present in the ANSP (Robertson *et al* 1981), in the LCM (Norris in Lit.) or NMW (Trew 1983). The original locality data (Malta, Gibraltar [*sic*] and Mozambique) are obviously suspect.

Other workers besides Wagner & Abbott (1978) have regarded *H. alternata* as a synonym or form of *H. pustulata* (Weinkauff 1883; Pilsbry 1890; Kaicher 1981) and this highlights a question which still needs to be addressed. Is *rugosa* Lamarck, 1822, not simply yet another expression of the highly variable *pustulata* and one which is more common on, if not endemic to, the Mascarene Islands? This is a question which cannot be answered satisfactorily at present due to the very poor state of haliotid alpha taxonomy in the Indo-West Pacific. To date haliotid taxa have been distinguished almost exclusively on the basis of shell characters whilst other potentially useful parameters such as radula morphology and external anatomy have been largely ignored. The extent of variation in *H. pustulata* is a problem which warrants a thorough investigation, particularly since *rugosa* is an earlier name. Certainly it would seem that *H. pustulata* and *H. rugosa* are sympatric in the Mascarene Archipelago and I have seen specimens which are somewhat intermediate in sculpture. Deshayes' *revelata* may represent the opposite extreme in *pustulata* variability – an almost totally smooth shell.

I give above, descriptions of the radula and external anatomy of typical *rugosa*, but at present few conclusions can be drawn from this as comparable data are not available for other Indo-West Pacific haliotids. The radula figures given by Thiele (1891) indicate interspecific differences to be small. Hickman (1984a) considered the three large food preparing teeth on either side of the central tooth field in the haliotid radulae to be modified marginals. Like the majority of other authors (Crofts 1929; Thiele 1929; Barnard 1963; Wu & Han 1987), I believe them to be laterals thus giving the above radula formula which is so common in the Vetigastropoda. Hickman's figures of the radula of *H. rufescens* Swainson, 1822, show it to have a right-anterior asymmetry in contrast to the left-anterior asymmetry of *H. rugosa*. Similar inconsistent asymmetry occurs in the Pleurotomariidae (Hickman 1984b) and Fissurellidae (Hickman 1983; Herbert 1987).

External anatomy, particularly the structure of the epipodium, is a potentially valuable source of additional comparative data and shows considerable variation within the family as a whole (Talmadge 1957 and pers. obs.). It will almost certainly provide supplementary characters useful in analysis of the many

inadequately defined haliotid subgenera that have been proposed, but whether or not its variation will assist specific discrimination within groups of species remains to be established. The epipodium of the present species seems to be similar to that of members of the *Sanhaliotis* species-group (pers. obs.).

Another species, *H. rugosa* Reeve, 1846 (*non* Lamarck, 1822), similarly of unknown origin, must also be mentioned in relation to the present study. Weinkauff (1883) noted the homonymy and provided the replacement name *H. strigata* for Reeve's species, although he remained uncertain as to the true identity of Lamarck's taxon. The type material of *H. rugosa* Reeve, 1846, is in the BM (1950.3.16.25–27, three specimens). It differs from *H. rugosa* Lamarck, 1822, in possessing strong axial folds. Pilsbry (1890) referred to yet another *rugosa*, that of Weinkauff (1883), stating that it represented the *lamellosa* form of *H. tuberculata* Linne, 1758. However, it is clear that Weinkauff merely used the term descriptively and listed under it the names *striata* Linne, 1767, and *lamellosa* Lamarck, 1822. It was not proposed as a new name.

Note: I have examined the two possible syntypes of *H. pustulata* Reeve, 1846, in the MVA (F1822) (see Boyd & Phillips 1985) and am very doubtful of their authenticity as types. Whilst they almost certainly represent this species, the original description states "beautifully marbled with green and white" whereas both these specimens are predominantly red-orange-brown and white with very little green. Furthermore the colour pattern of neither matches that of the figured specimen—the radial bands of colour peripheral to the shell foramina are much finer and more close-set in the MVA material. Although these specimens were evidently purchased from Reeve, and, like Reeve's original material, they originated from the Metcalfe collection, neither is the figured specimen and it seems unlikely that they formed part of the lot upon which the original description was based. The fact that no other Reeve material of *H. pustulata* is present in the BM is not reason enough to give type status to these MVA specimens. The word "type" on the oldest label remaining with the specimens has obviously been added subsequently.

#### ABBREVIATIONS

- ANSP = Academy of Natural Sciences, Philadelphia, USA.  
BM = The Natural History Museum, London.  
LCM = Leeds City Museum, England.  
MHNG = Museum d'Histoire Naturelle, Geneva.  
MVA = Museum of Victoria, Melbourne, Australia.  
NM = Natal Museum, Pietermaritzburg, South Africa.  
NMW = National Museum of Wales, Cardiff.

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